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July 10, 2000

Via Hand Delivery

Magalie Roman Salas, Secretary
Federal Communications Commission
445 12th St., S.W., Room TW-B204
Washington, D.C. 20554

Re: Ex Parte File Nos.ET Docket No. 98-206,
48-SAT-P/LA-97, 89-SAT-AMEND-97,
130-SAT-AMEND-98

Dear Ms. Salas:

SkyBridge L.L.C. ("SkyBridge") hereby submits its views on the ability of its nongeostationary orbit ("NGSO") fixed satellite service ("FSS") system and certain terrestrial point-to-multipoint ("PTM") systems to share spectrum in the 12.2-12.7 GHz band. As discussed in greater detail below, the Commission should issue a public notice or otherwise call for comment by other interested parties on the proposals made herein.

As the Commission is aware, SkyBridge has endeavored over the past two years to determine whether, and, if so, how, its NGSO system might coexist in the 12.2-12.7 GHz band with the PTM system proposed by Northpoint Technology, Ltd. ("Northpoint"). Below, SkyBridge provides the outline of a regulatory framework under which it believes that its NGSO system and Northpoint's PTM system could operate on a co-frequency basis, given certain assumptions regarding those systems and the overall interference environment. SkyBridge acknowledges, however, that this framework may or may not be adequate to meet the needs of other proposed NGSO FSS and PTM systems; the details regarding many of these systems presently on file with the Commission are inadequate for SkyBridge to make any definitive assessment in that regard.[1]

[1] SkyBridge expresses no view on whether adoption of the regulatory regime described herein would affect the ability of PTM systems to coexist with direct broadcast satellite ("DBS") systems.

I. BACKGROUND

After three years of extensive discussions in various ITU fora, rules have been adopted at the international level that define the environment in which NGSO, GSO and terrestrial systems can share spectrum at Ku-band. Because NGSO FSS systems are designed to have a worldwide coverage, it was crucial to establish a global framework for such coexistence. With regard to the 12.2-12.7 GHz band, limits of EPFD $_{down}$ (Article S22) have been defined to protect DBS operation in, inter alia, Region 2, and limits on PFD (Article S21) have been defined to protect any terrestrial use of the band.

Northpoint has raised an additional sharing scenario at the Commission with respect to the 12.2-12.7 GHz band, which involves the interaction among its proposed PTM terrestrial system and NGSO FSS systems and DBS systems. This presents complex sharing issues. The Northpoint PTM system is designed to transmit in the side lobes and backlobes of GSO DBS receivers, which tend to point towards the south in the United States. As opposed to the GSO systems, NGSO earth stations can (and generally do) point in all directions, including in the direction of the PTM transmitter.

In order to assess the feasibility of co-frequency operations by a PTM system and a NGSO system, it is crucial to determine the envelope of the interference that can be received by the NGSO user terminals. This envelope depends on several PTM transmitter characteristics, including, inter alia: (1) the power transmitted; (2) the antenna gain; (3) the height of the transmitter; (4) the tilt of the antenna; (5) the polarization of the transmitter; (6) the density of the transmitters; and (7) the terrain profile. Terrestrial systems need a degree of flexibility in their parameters in order to deploy, as they are constrained by the terrain profile, transmitter installation restrictions, and the like. As a consequence of the number of variables that could affect any interference analysis, it appears that the most effective means of addressing this issue is to ensure an overall environment in which NGSO user terminals can operate, without regard for the particular configuration of the PTM system.

In assessing the interference environment for NGSO user terminals, the service area of each PTM transmitter should be divided into two zones:

- The "green zone," in which the power received on the ground is low enough to permit co-frequency operation of the PTM system and the NGSO system; and

- The "red zone," in which the interference from the PTM transmitter is too high to permit co-frequency operation of the NGSO system.

The size and the location of the red area depends on the transmission characteristics of the PTM transmitter. Based on the technical parameters available for the Northpoint PTM system, the red zone is assumed to be in the vicinity of the terrestrial transmitter.

In order for a SkyBridge user terminal located in the vicinity of a Northpoint transmitter to have access to the SkyBridge space segment utilizing a carrier outside the 12.2-12.7 GHz band, it is required that:

- the power transmitted by a PTM system in the receiving band of the NGSO user terminal (11.7-12.7 GHz for the SkyBridge user terminals) does not saturate the RF layer of the user terminal; and

- the interference generated by the out-of-band emissions of the PTM transmitter is low enough to allow unconstrained operation of carriers available outside the band 12.2-12.7 GHz.

It is critical to limit the number of NGSO user terminals for which the choice of the carrier is constrained by PTM interference. Thus, it is essential to limit the number of user terminals located in a Red Zone. Put another way, it is crucial to ensure that, for example, 90% of any Northpoint transmitter's service zone qualifies as a Green Zone, and that the density of such transmitters will be sufficiently low to avoid creating significant overlaps, as this would increase the size/number of Red Zones.

In addition to the operational needs of NGSO systems, the needs of the PTM systems must be examined. For example, Northpoint proposes to operate with user terminals smaller than the standard antennas used by the Fixed Service ("FS") in the 12 GHz bands, and with much smaller margins. As a consequence, Northpoint seeks an additional 10 dB of protection at low elevation angles from what has been agreed internationally with respect to NGSO/FS co-channel operations, in order to protect its user terminal reception. A restriction at low elevation angles directly affects the level of power that can be transmitted at higher elevation angles. A tightening of the Article S21 limits by 10 dB would be dramatically constraining for the NGSO FSS operation.

II. PROPOSED REGULATIONS

SkyBridge is confident that the regulatory framework discussed below would provide a basis for feasible coexistence between its NGSO system and Northpoint's PTM system in the 12.2-12.7 GHz band. Obviously, many details remain to be resolved and, as noted supra, it remains to be seen whether other NGSO and PTM systems could coexist under such a framework. In any examination of these issues, it is critical to recall that these systems have not yet been deployed. This fact affords a measure of flexibility to the respective system designers to facilitate operations in a shared use environment, although some systems, being at different stages of their design processes, may have greater flexibility than others.

A. Constraints on PTM Operations

SkyBridge proposes that all PTM terrestrial systems be required to meet the following limits.

1. In order to ensure full access for NGSO user terminals to carriers outside of the 12.2-12.7 GHz band, the maximum aggregate power generated by all PTM emissions in both polarizations (if used) within the 12.2-12.7 GHz band must be limited, at the input of any NGSO customer receiver, to an EPFD of –132.1 dB(W/m²/4 kHz), with a corresponding power limit of -68 dBm at the output of an operational NGSO earth station antenna with a gain of 31.6 dBi at 12.5 GHz.[2]

2. Limit the emissions of PTM transmitters out of the band 12.2-12.7 GHz to:

Frequency separation from the edge of the terrestrial carrier	***Adjacent Channel Protection***
In the band 12.188-12.2 GHz (0-12 MHz from the operating band)[3,4]	25 dB*
In the band 12.164-12.188 GHz (12-36 MHz from the operating band)[3,4]	35 dB*
In the bands below 12.164 GHz (>36 MHz from the operating band)[3,4]	43+10×log10(power in watt)

* Attenuation compared to the power level of one single PTM carrier

Frequency separation from the edge of the terrestrial carrier[5]	***EPFD in the band 11.7-12.164 GHz***
In the bands below 12.164 GHz (>36 MHz from the operating band)	-169.1 dB (W/m²/ 4 kHz)

3. Limit the power received by a NGSO user terminal from a PTM system over a large proportion of the PTM transmitter's service area[6] (typically 90%) to a power flux of

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[2] See SkyBridge L.L.C. Application, Appendix B to Amendment filed January 8, 1999.

[3] These limits are in accordance with Section 78.103 of the Commission's Rules, 47 C.F.R. § 78.103, for out-of-band emissions for the CARS Service, as applied to a carrier bandwidth of 24 MHz.

[4] As these levels are defined relative to the maximum power transmitted, it is necessary to define an absolute limit which protects NGSO FSS operation in the band 11.7-12.2 GHz. This limit would be an EPFD limit in the band 11.7-12.2 GHz.

[5] The chart above defined the out-of-band emission relative to maximum power transmitted. This chart specifies the necessary EPFD limit to ensure that NGSO systems can protect their links in the band 11.7-12.2 GHz.

[6] The service area of a PTM transmitter is the area within which user terminals can receive service. In the case of Northpoint, the service area appears to be the area within which the power received at the output of an antenna of 45 dBi

(continued...)

−106.5 dB(W/m²) in a NGSO carrier of 22.6 MHz bandwidth, or a PFD of −120 dB(W/MHz)

4. Limit the density of PTM transmitters, so that an EPFD of -135.1 dB (W/m^2/ 4 kHz) is not exceeded in more than 0.2% of the service area of any PTM system.

B. Constraints on NGSO Operations

As noted above, Northpoint seeks a level of protection far in excess of that required by other terrestrial services. Nonetheless, a regulatory mechanism could be devised that would accommodate the alleged needs of such PTM systems, assuming an adequate demonstration of their legitimacy. For example, the Article S21 limits are "envelope" limitations, and in operation, SkyBridge will operate in most cases at levels lower than those established by the Radio Regulations, particularly at low elevation angles, as propagation is improved by high elevation angles. After extensive analysis, SkyBridge believes that its system could provide a significant level of protection to Northpoint, on an operational basis. The PFD limits set out in the table below would function in a way similar to the manner in which NGSO systems protect GSO operations, e.g., through the operational limits in Article S22.

Angle of Arrival (δ)	**0-2°**	**2-5°**	**5-25°**	**25-90°**	**Units**
12.2 - 12.7 GHz	-134	-134 + 3.33 (δ-2)	-124 + 0.5 (δ-5)	-114	dB(W/m^2/MHz)

Compliance with such operational limits would impose significant constraints on the deployment and operation of the SkyBridge system. Nonetheless, SkyBridge believes that these parameters represent a substantial initial step in creating an environment in which NGSO and PTM systems can coexist. As emphasized supra, however, SkyBridge does not presume to speak for other NGSO FSS applicants, let alone the PTM applicants. Whether the above-described regulatory structure is sufficient to meet the needs of others, or whether a different structure would be preferred, is an appropriate matter for additional Commission inquiry.

There is, however, no rational reason why that further inquiry should delay Commission action on the various NGSO/GSO/FS issues that have long been ripe for decision in the instant proceeding. Particularly now that WRC-2000 has resolved these issues at the international level, the Commission should move forward as expeditiously as practicable.

(...continued)
gain at 12.5 Ghz, is higher than −156 dBW over a 24 MHz carrier.

If there are any questions regarding this matter, please contact the undersigned.

Respectfully submitted,

Jeffrey H. Olson
Attorney for SkyBridge L.L.C.

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